Multianalytical approach of stay-in-place polyvinyl chloride formwork concrete exposed to high temperatures

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Abstract

This work presents results of the first study of the variation by exposure to high temperatures from two stay-in-place polyvinyl chloride (SIP-PVC) formwork concrete exposed to the ISO 834 fire curve. A systematic sampling based on the proximity of the fire and the spalling of the concrete was carried out and microstructural, thermal, crystallographic and spectroscopic changes were studied according to the degree of affectation by fire using SEM, TGA-DTA, XRD and FTIR. The response to high temperature exposure of the microstructure of SIP-PVC formwork concrete after fire was established using the experimental results. Results show a relationship between the microstructure of concrete paste and exposure temperature, as well as, the relationship between exposure temperature and dehydration of calcium hydrates, CSH gel and Portlandite and decarbonation of Calcite. These reactions can be considered as tracers of the degree of exposure to high temperatures from stay-in-place PVC formwork concrete.

Keywords

Stay-in-place polyvinyl chloride; Self-compacting concrete; High temperature; Microstructural changes; Thermal analyses.